

Overview of Environment Statistics

FDES: Framework for the Development of
Environment Statistics



System of
Environmental
Economic
Accounting

<http://www.unescap.org/our-work/statistics>

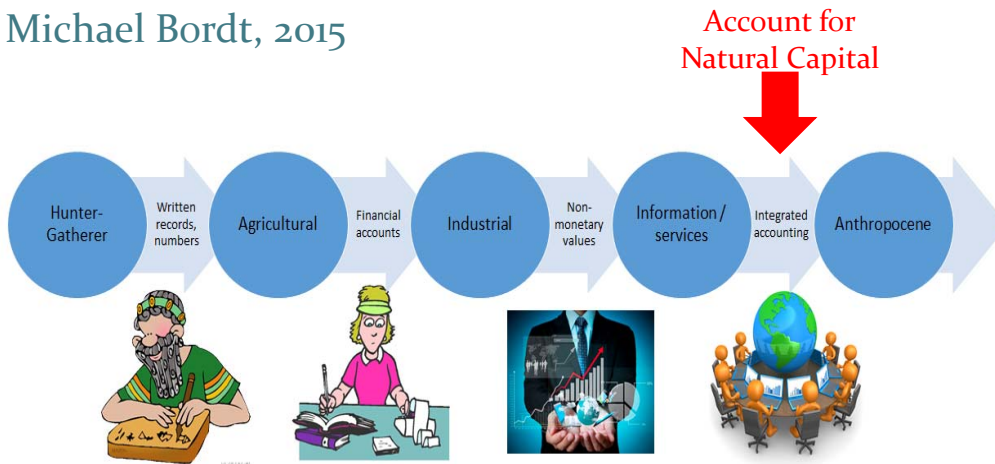
Highlights of Presentation

- Decisions are becoming more **integrated**:
 - SDGs, green economy, climate change, biodiversity, **nexuses**
- Need **integrated**, ongoing, reliable information
- Environment statistics are produced by many agencies
 - **Fragmented** and require standardization
- **Official statisticians** have tools and capacity to standardize and integrate environment statistics
 - FDES guidance on **collecting** environment data
 - SEEA for **integrating** environmental with economic data

Observation on accounting:

If we managed our economy the way we manage our environment, we'd still be hunter-gatherers.

- Michael Bordt, 2015



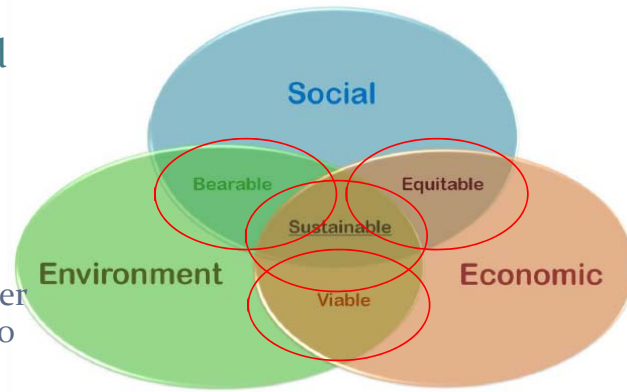
What's the problem?

- Decisions are becoming more **integrated**:
 - Sustainable development; green economy; climate change; biodiversity
 - Develop or conserve? Where to develop?
 - Short/Long-term benefits? Who benefits?
- Environment statistics are produced by many agencies
 - Therefore **fragmented** and require standardization
- NSOs have focussed on economic and social statistics
 - May not have people or institutional arrangements to produce environment statistics

Which of your countries have environment section in your NSO?

Decisions are integrated (Nexus)

- People need water, food and energy, while
 - limiting climate change
- **Viable** energy options may reduce
 - **equitable** access to water and food while adding to
 - **unBearable** climate change
- **Local optimization doesn't work any more!**



New **statistical tools** enable us to quantify these linkages and understand the trade-offs.

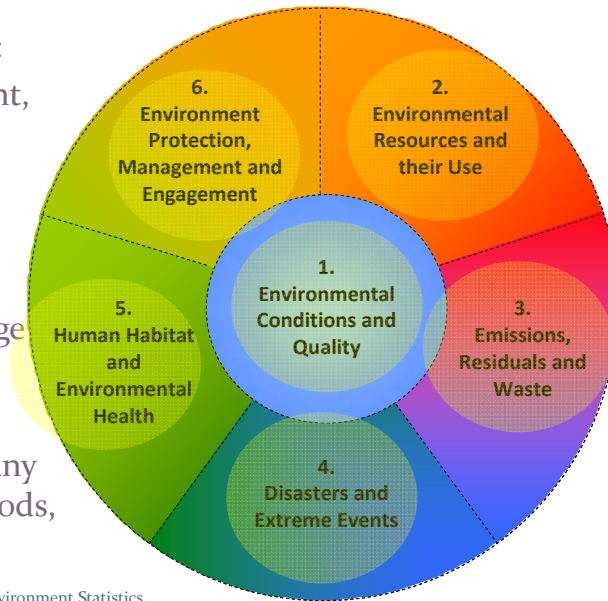
Why National Statistical Offices (NSOs)?

- “*Fundamental principles of official statistics*” foster:
 - Culture of quality, impartiality, confidentiality, relevance
 - Trust by government, business and civil society
- Tools and expertise to work with **complex** data
- Confidential data collection **processes** (surveys, accounts, administrative data) can be adapted for environment statistics
- Often custodians of the **National Statistical System & SDG** monitoring and reporting

Environment statistics are *interdisciplinary* and *inter-institutional*

Environment statistics are about:

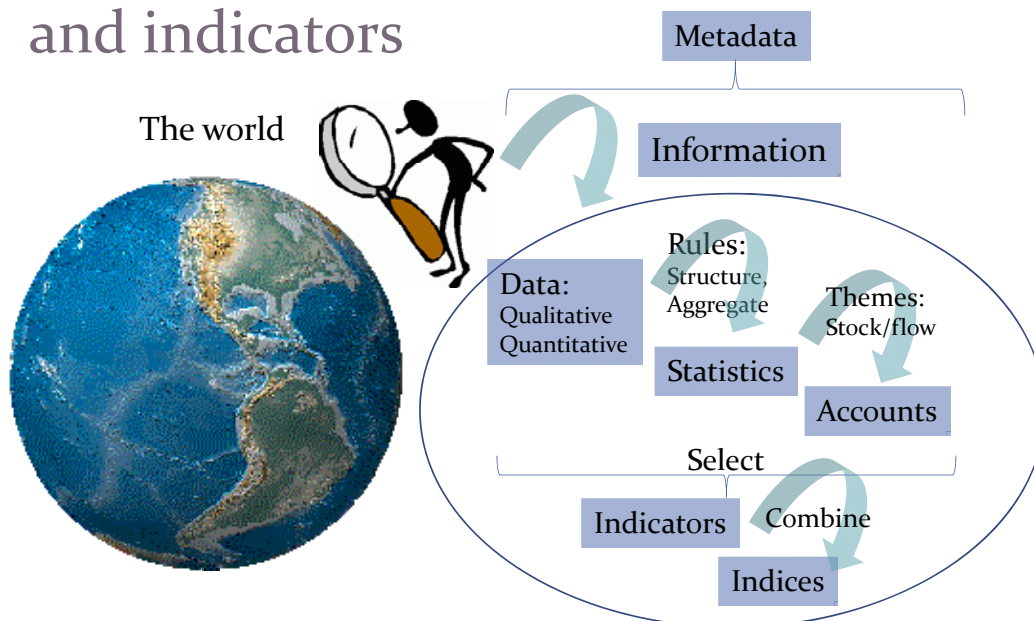
1. the **state** of the environment,
2. our **dependence** on it,
3. our **impact** on it,
- 4, 5. its **impact** on us (even negative ones), and
6. how we **protect** and manage it.



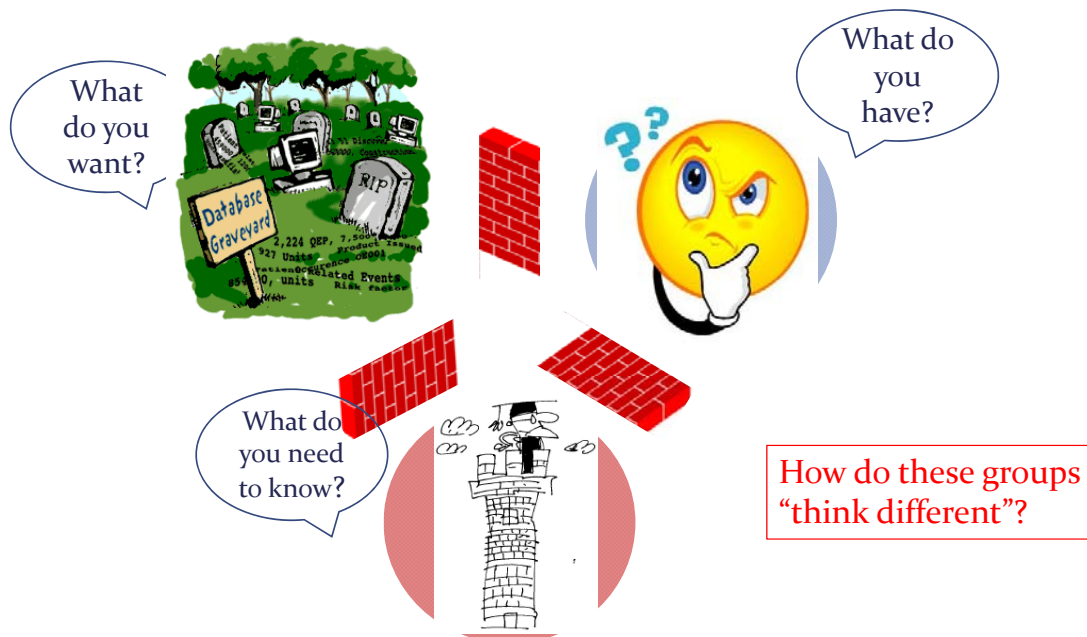
This information comes from many institutions using different methods, concepts and classifications.

FDES: Framework for the Development of Environment Statistics

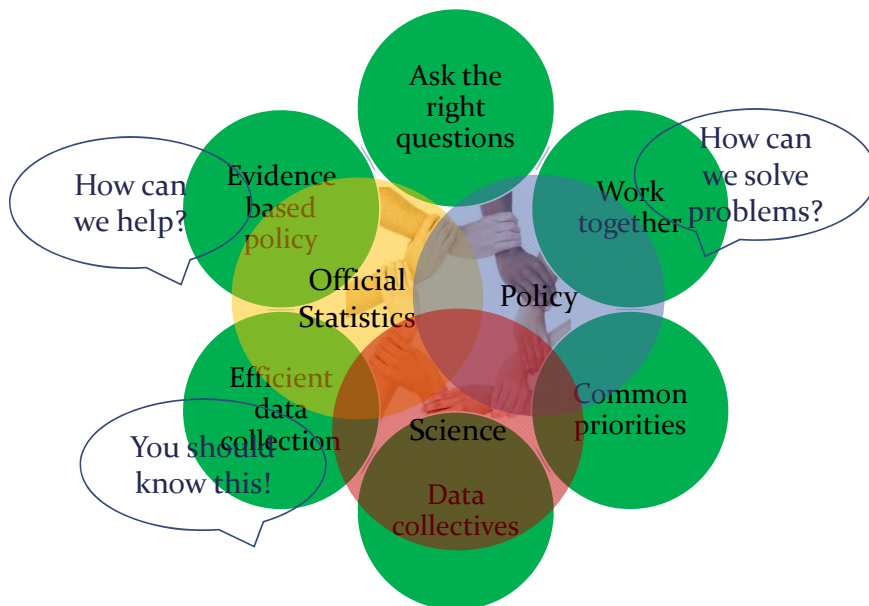
Information, data, statistics, accounts and indicators



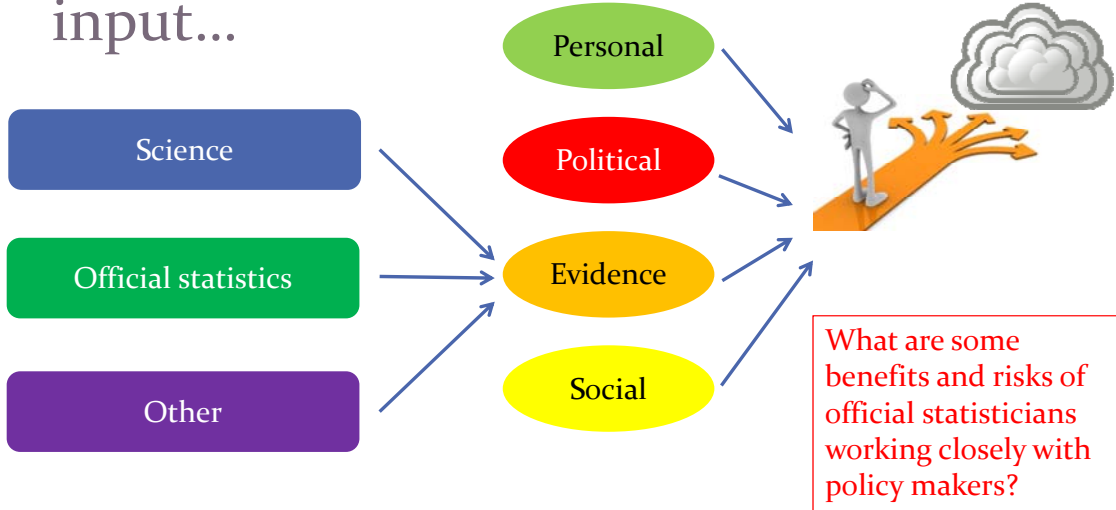
Three solitudes...



...or convergence?

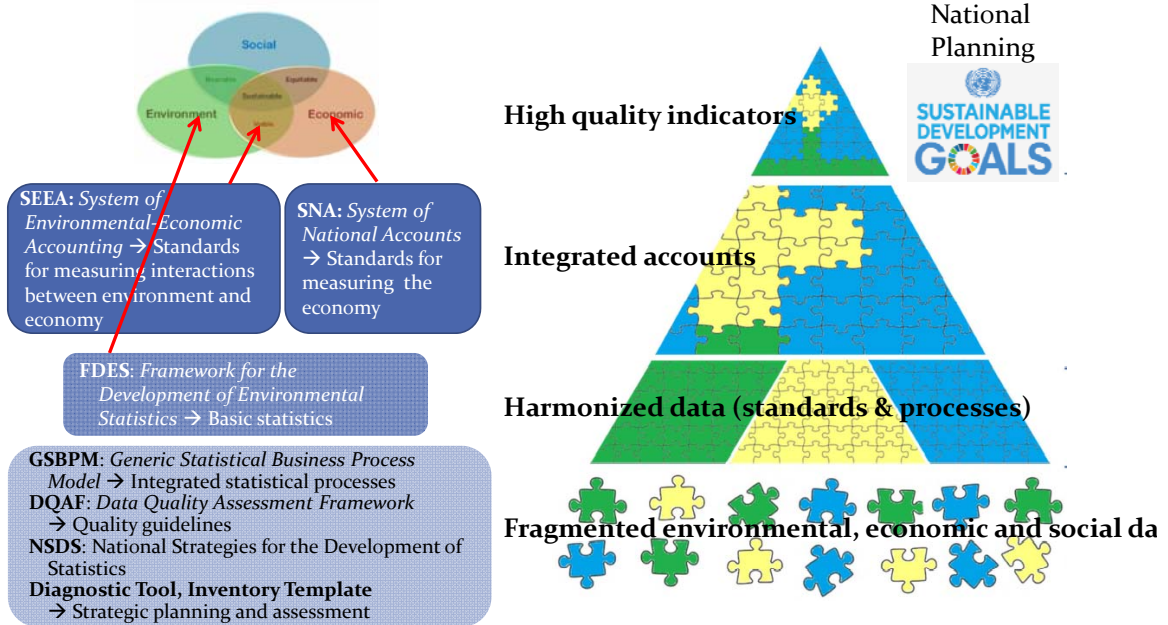


Official statistics are not the only input...

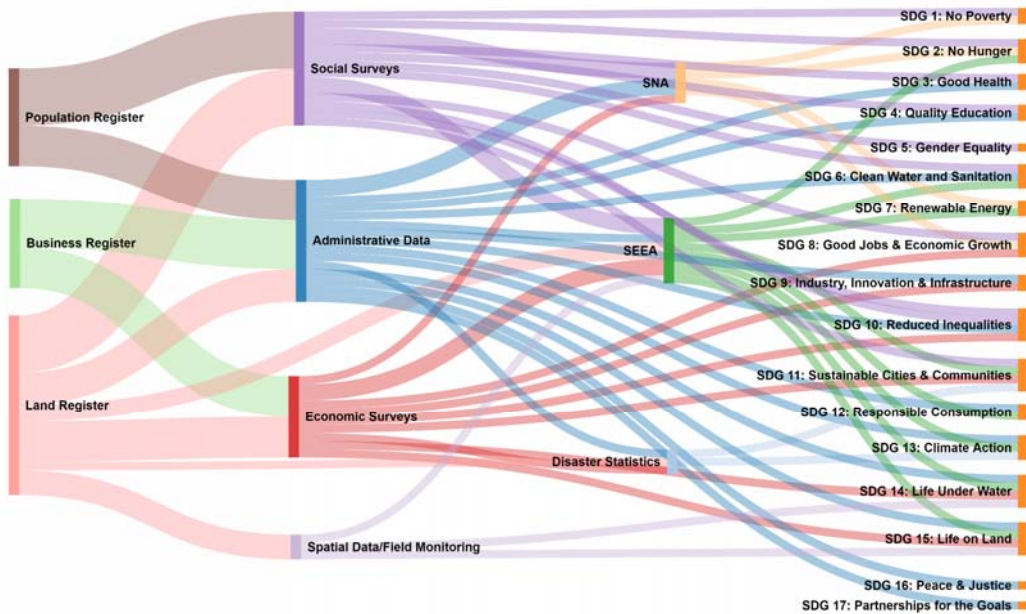


Good statistics are cheaper than bad decisions

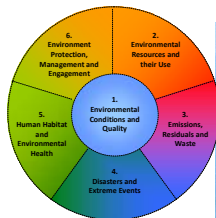
Statistical tools for integration



SDGs need registers, data and frameworks

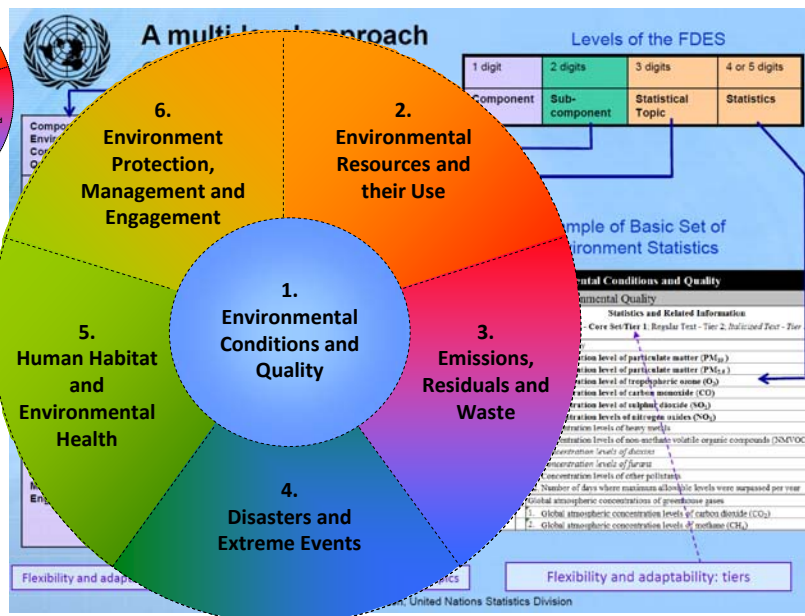


FDES Structure



FDES describes the scope and components of environment statistics; harmonizes data with common standards

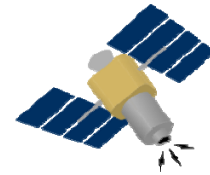
→ SEEA integrates these data into "accounts"



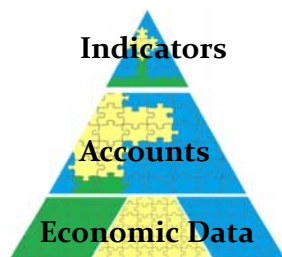
SEEA in the SNA

- *SNA 2008 p. 534*
- 29.104 *As with the SNA, the SEEA accounts provide*
 - *a scorekeeping function from which **key indicators** can be derived and*
 - *a management function in that they can be used in the analysis of **policy options**.*
- If you want to know the importance of nature to the economy → SEEA

What is a “satellite account”?



Another observation on accounting



Economic statistics:

- Macro-economic **theory**
- Trusted **framework** (SNA)
- Accepted **indicators** (GDP...)
- Statistical **infrastructure**

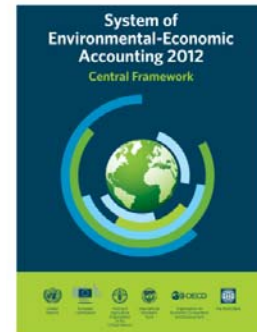
Environment statistics:

- **Many** theories
- Collected for **specific** purposes
- Few accepted **indicators**
- Little statistical **infrastructure**

Do you need “accounts” to produce ~~indicators~~ indicators?

SEEA is

- A **coherent** measurement framework linked to SNA:
 - Aligns concepts, classifications and methods
- Based on **accounting** principles & systems theory
- Flexible and modular
 - Select and adapt components to country needs
 - Don't need to be complete to be useful
- Since 1992, has been implemented, in part, by over 90 countries
- Is **NOT**: a model, database or analytical framework

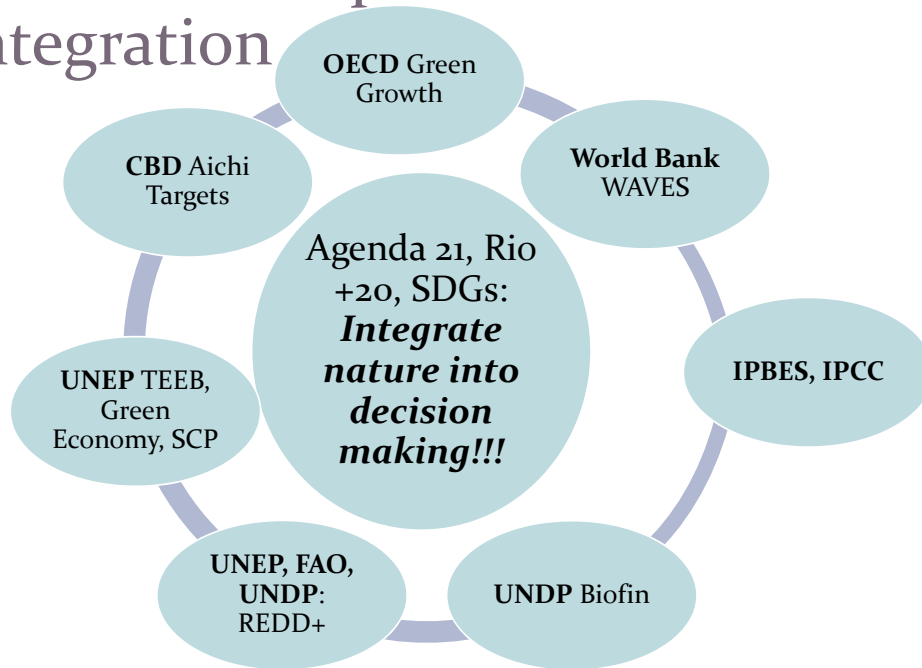


SEEA does

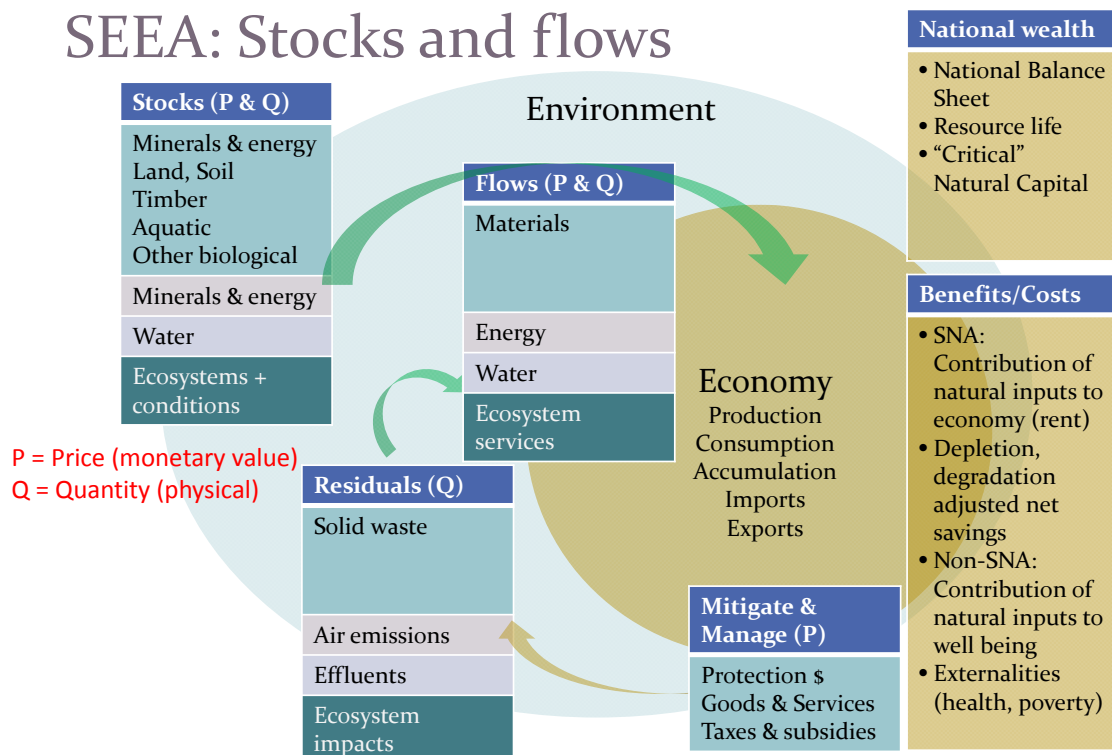
- Provide guidance on producing “accounts” for:
 - Natural inputs to the economy,
 - Impacts of the economy on the environment, and
 - Expenditures to mitigate impacts
- Support sustainable statistical infrastructure to **regularly** produce relevant accounts and indicators
- Improve **coherence** by standardizing concepts, classifications and methods
- Reduce **overlaps** in data collection
 - “collect once, use many times”
- Improve **relevance** by linking to SNA



International platforms for integration



SEEA: Stocks and flows



Environment accounts and statistics

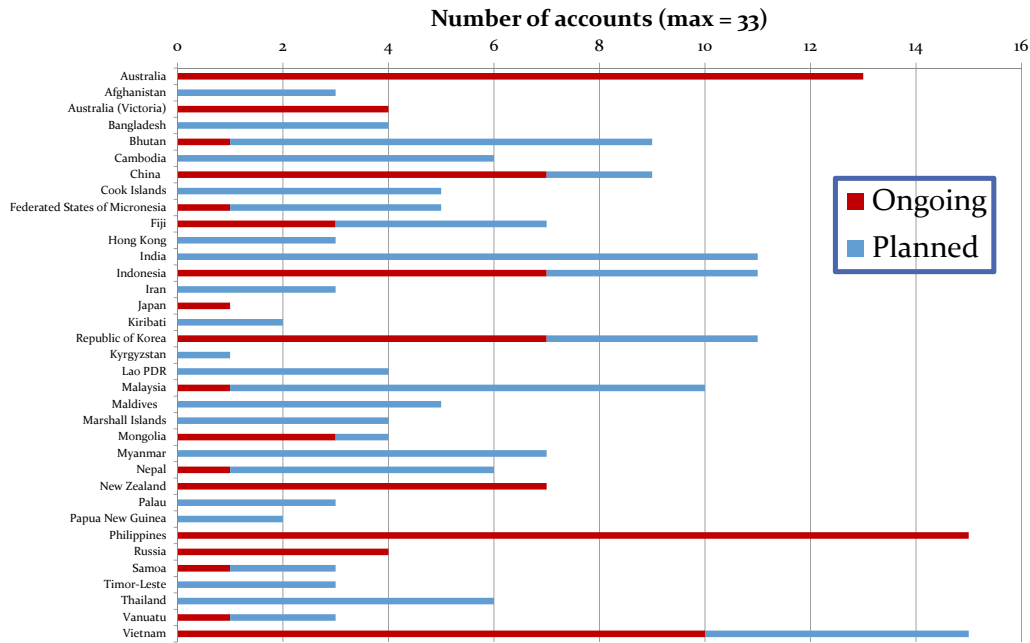
SEEA-CF (Central Framework)	<ul style="list-style-type: none"> • Assets • Physical flows • Monetary flows 	<ul style="list-style-type: none"> • Minerals & Energy, Land, Timber, Soil, Water, Aquatic, Other Biological • Materials, Energy, Water, Emissions, Effluents, Wastes • Protection expenditures, taxes & subsidies
---------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Where to start?

Priority concerns	Related accounts and statistics	Related SDGs
1. Forest degradation 3. Land degradation	Land Asset Account Ecosystem Account (Extent)	15 Life on Land
2. Water resources and quality	Water Account (Asset; Supply /Use) Ecosystem Account (Water)	6 Water 14 Life on Water
4. Climate change	Energy Account → Air Emissions Ecosystem Account (Carbon)	7 Energy 13 Climate
5. Solid waste management	Solid Waste Account	11 Urban 12 Consumption
6. Biodiversity loss	Ecosystem Account (Biodiversity)	14 Oceans 15 Life on Land
7. Impacts of mining on the environment	Land Asset Account Ecosystem Account (Condition)	15 Life on Land

Source: ADB Myanmar Environmental Performance Review 2012.

Asia and the Pacific SEEA Progress (preliminary)



The details



Balancing nature's books



- Stock/flow → Assets, Supply/Use
 - **Asset Accounts:** Opening balances, additions, removals, closing balance
 - **Supply/Use Accounts:** Supplier → User
- Double/quadruple entry
 - Monetary and physical transaction between supplier and user
- Time of recording: **When** transaction occurred
- Consistent units of measure, concepts, classifications, methods & valuation rules



What is an “account”?

One common theme:
Common unit of measure
Convert (\$/month, litres/day, m³/month)

Different data sources:
Household survey: 100
Municipal admin: 300
Industry survey: 175

All users/uses

Water use account (m³/year)

Rows add up

Sources of abstracted water	Use of water					Total use
	Agriculture, forestry and fishing	Electricity, gas, steam and air conditioning supply	Water collection, treatment and supply	Other industries	Households	
Inland water resources						
(A) Surface water	-	1,000	575	25	5	1,605
(B) Groundwater	250	-	-	-	10	260
(C) Soil water	10,000	-	-	-	-	10,000
(E) Sea water	-	-	25	-	-	25
(F) Total abstracted water	10,250	1,000	600	25	15	11,890
Abstracted water						
(G) Distributed water (to other economic units)			500			
(H) Use of water (from other economic units)	300	75	-	25	100	500
(I) Own use	10,250	1,000	100	25	15	11,390
Total use of water (abstracted and distributed water)	10,550	1,075	100	50	115	11,890

Columns add up

Total

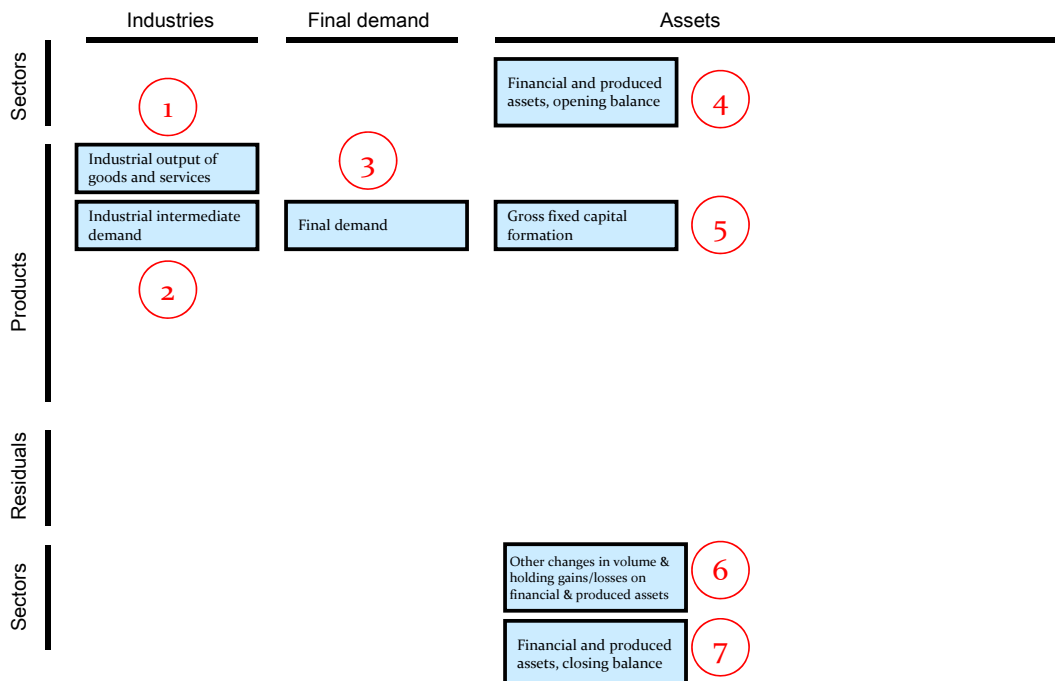


The SEEA and the SNA

- The SNA measures national economic activity, production and assets (wealth):
 - In **monetary** terms
 - By tracking transactions between **economic units** (businesses, households, governments)
- The SEEA measures environment/economy transactions:
 - Expands asset boundary (includes **physical** natural assets)
 - Distinguishes expenditures on **environmental protection**
 - Records **physical** quantities of natural inputs to the economy
 - Records **residuals** produced and consumed (and by whom)
 - Records changes in **private** and **public** natural assets

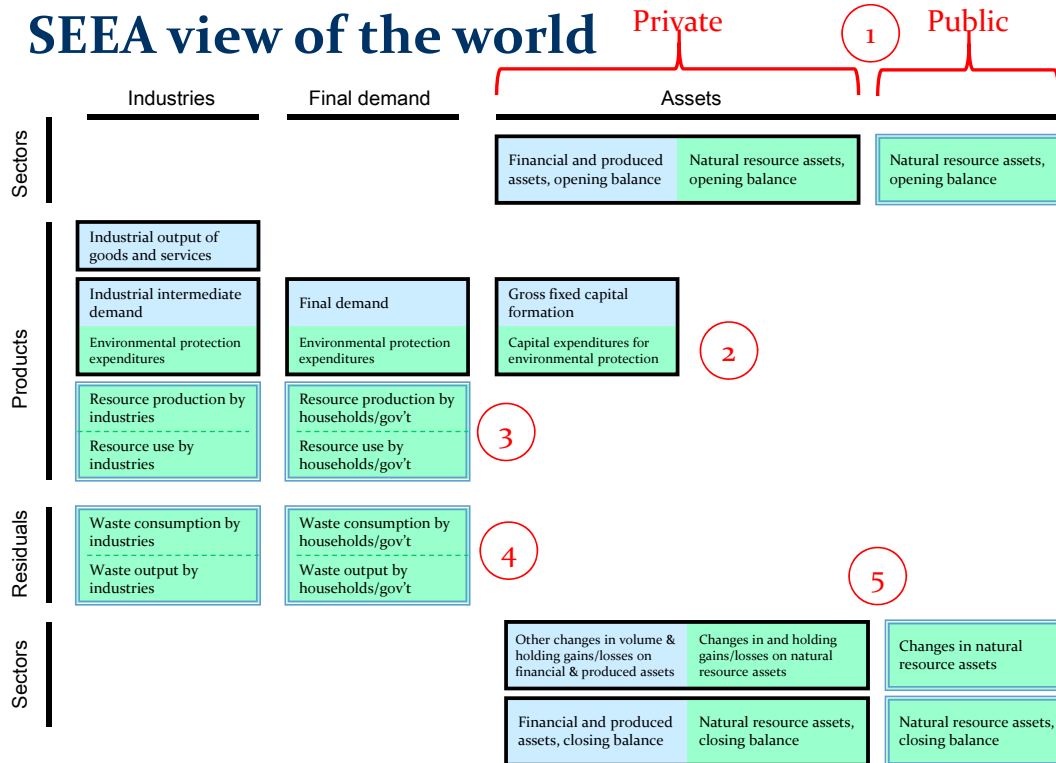


SNA view of the world

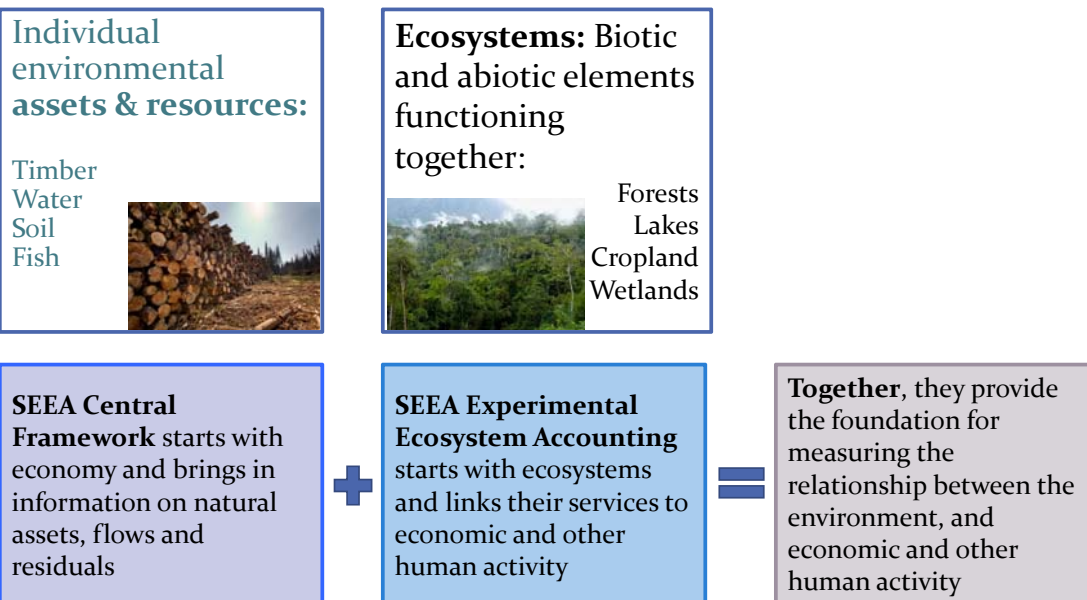




SEEA view of the world



One environment: Two perspectives



Environment accounts and statistics

SEEA-CF (Central Framework)	<ul style="list-style-type: none"> • Assets • Physical flows • Monetary flows 	<ul style="list-style-type: none"> • Minerals & Energy, Land, Timber, Soil, Water, Aquatic, Other Biological • Materials, Energy, Water, Emissions, Effluents, Wastes • Protection expenditures, taxes & subsidies
SEEA Water; SEEA Energy; SEEA Agriculture, Forestry and Fisheries	Add sector detail	As above for <ul style="list-style-type: none"> • Water • Energy • Agricultural, Forestry and Fisheries
SEEA-EEA (Experimental Ecosystem Accounting)	Adds spatial detail and ecosystem perspective	Extent, Condition, Ecosystem Services, Carbon, Water, Biodiversity
FDES (Framework for the Development of Environment Statistics)	Basic statistics for above plus...	<ul style="list-style-type: none"> • Extreme events and disasters • Human settlements and health • Protection, management & engagement

SEEA-CF – The Accounts



• **Assets** (= stocks; physical and monetary):

- Mineral and energy resources
- Land, Forest
- Soil
- Timber
- Aquatic resources
- Other biological resources
- Water





SEEA-CF – The Accounts



• Physical flows

- Supply/use for materials (extract → consume)
- Material flows (through economy) to final demand (e.g., GHGs)
- Water supply/use
- Energy supply/use
- Residuals
 - Air emissions
 - Water emissions
 - Wastes (generated and used/recycled)



SEEA-CF – The Accounts



• Monetary flows

- Environmental protection expenditures (demand side)
- Environmental goods and services sector (supply side)
- Resource use and management
- Environmentally-related payments by & to government (fines, fees, taxes, subsidies, concession payments)



Environment accounts and statistics

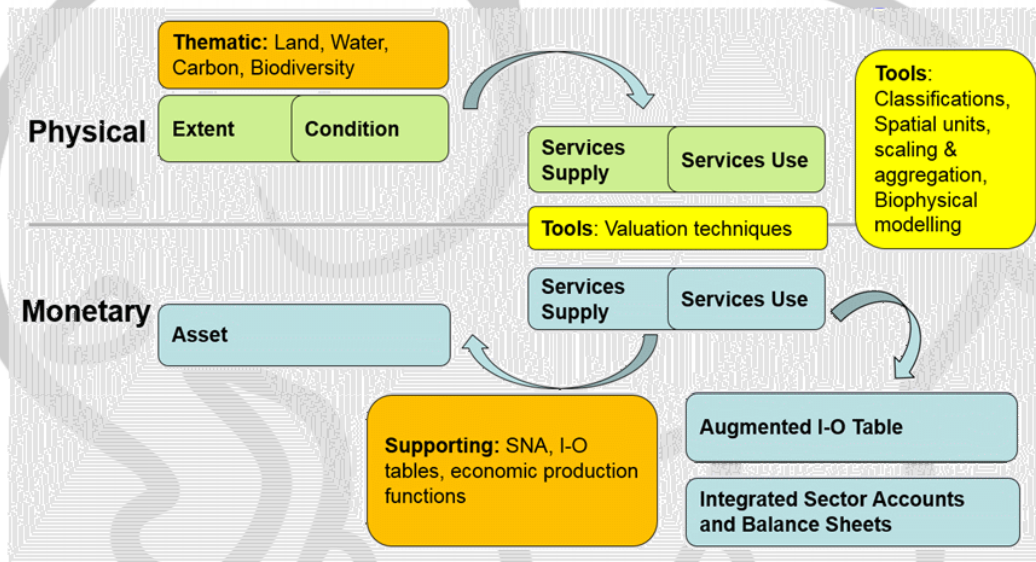
SEEA-CF (Central Framework)	<ul style="list-style-type: none"> • Assets • Physical flows • Monetary flows 	<ul style="list-style-type: none"> • Minerals & Energy, Land, Timber, Soil, Water, Aquatic, Other Biological • Materials, Energy, Water, Emissions, Effluents, Wastes • Protection expenditures, taxes & subsidies
SEEA Water; SEEA Energy; SEEA Agriculture, Forestry and Fisheries	Add sector detail	As above for <ul style="list-style-type: none"> • Water • Energy • Agricultural, Forestry and Fisheries
SEEA-EEA (Experimental Ecosystem Accounting)	Adds spatial detail and ecosystem perspective	Extent, Condition, Ecosystem Services, Carbon, Water, Biodiversity
FDES (Framework for the Development of Environment Statistics)	Basic statistics for above plus...	<ul style="list-style-type: none"> • Extreme events and disasters • Human settlements and health • Protection, management & engagement

SEEA-EEA (Ecosystem Accounting)

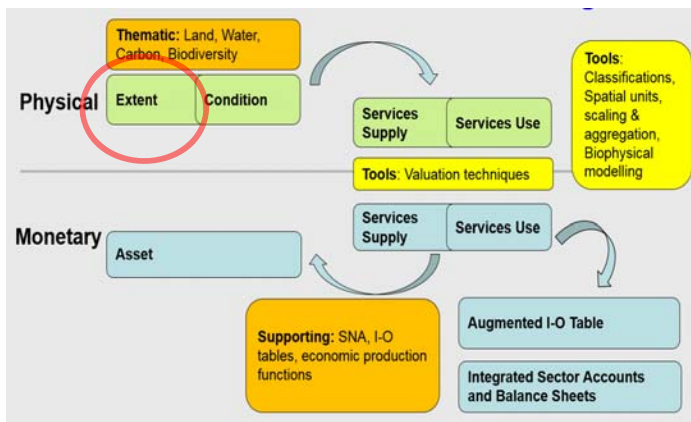
- *SDG Target 15.9: By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts*
- “Experimental” = in progress
- Spatial framework of ecosystem units (30-100m)
 - *Extent* of ecosystem types
 - *Condition* of ecosystem asset
 - Classification and valuation of *ecosystem services*
- Links to SEEA-CF and SNA
- Tested in Australia, Canada, Mauritius, Netherlands, Philippines, pilot countries (Bhutan, Chile, Indonesia, Mexico, South Africa, Vietnam)



SEEA-EEA Overview



SEEA-EEA Accounts and tools

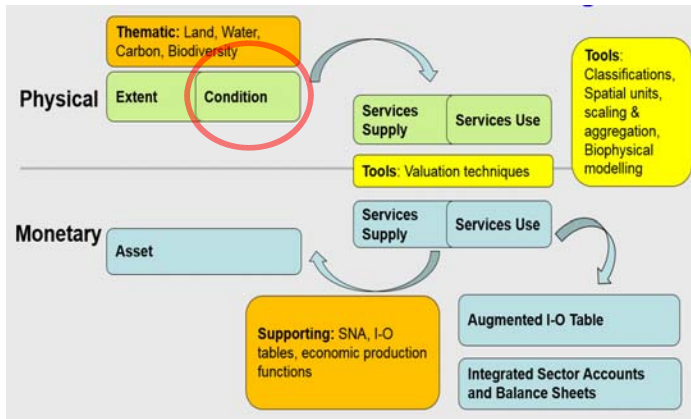


Extent account

- Ecosystem type + ownership and use
 - Changes over time
- General agreement on what exists on surface of country
- Land cover change (where, why?)



SEEA-EEA Accounts and tools



Condition account

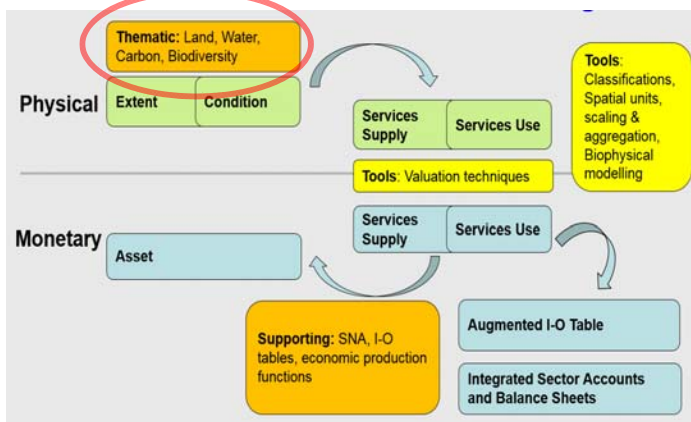
- “Quality” and biophysical measures important to Ecosystem Services (ES)

→ Overall condition, changes, location of changes

→ Future flows of ES



SEEA-EEA Accounts and tools



Thematic accounts

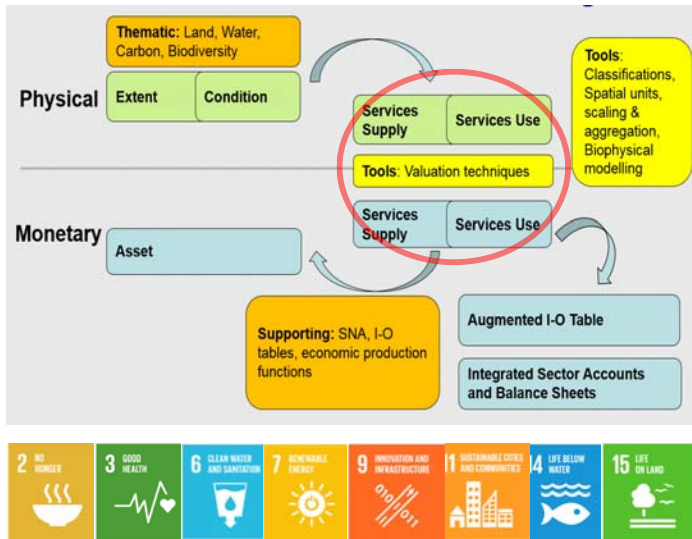
- Land (spatial detail)
- Water (spatial detail, quality, ecosystems as beneficiaries)
- Biodiversity (species ranges, characteristics, populations)
- Carbon (focus on biocarbon)

→ Contribute to **Condition Accounts**

→ Focus on specific issues



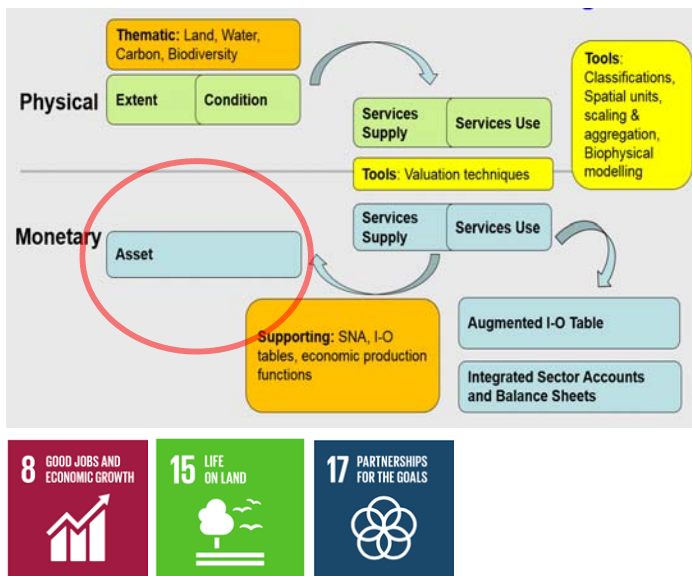
SEEA-EEA Accounts and tools



Ecosystem Services supply / use accounts

- Physical measures
 - Use by beneficiaries
 - **Valuation** to estimate monetary values
- Contribute to monetary **Asset Account** & links to SNA

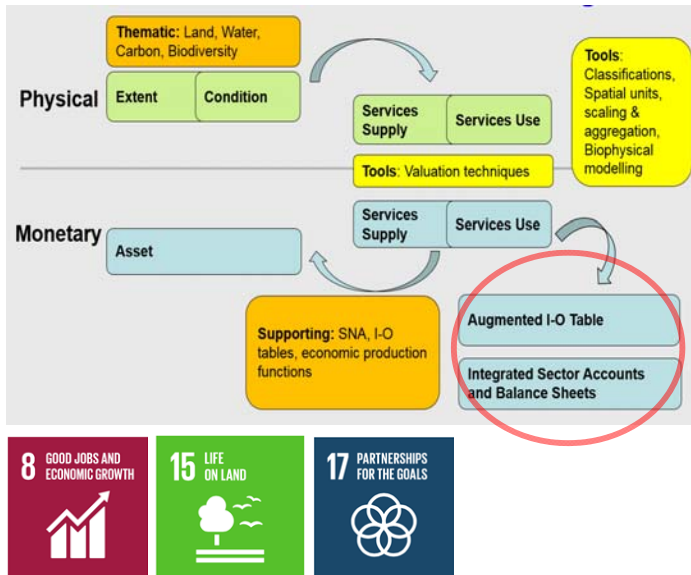
SEEA-EEA Accounts and tools



Monetary asset accounts

- Net Present Value of future flow of services
- Trade-offs
- Contribute to **Balance Sheets**

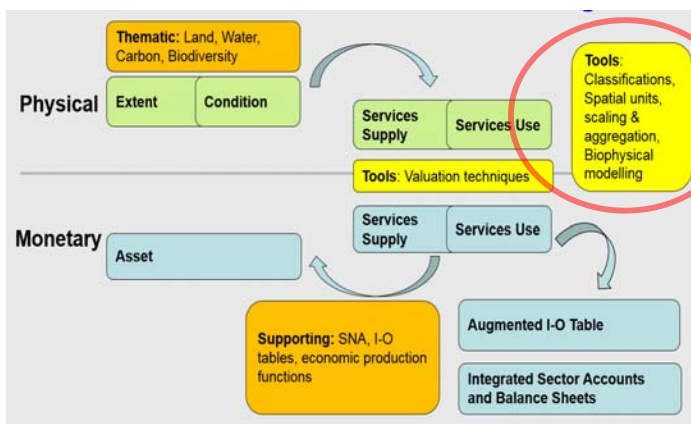
SEEA-EEA Accounts and tools



Links to SNA

- Ecosystem Services in economic production functions
 - Degradation and depletion-adjusted aggregates (e.g., value added minus depreciation)
- Trade-offs

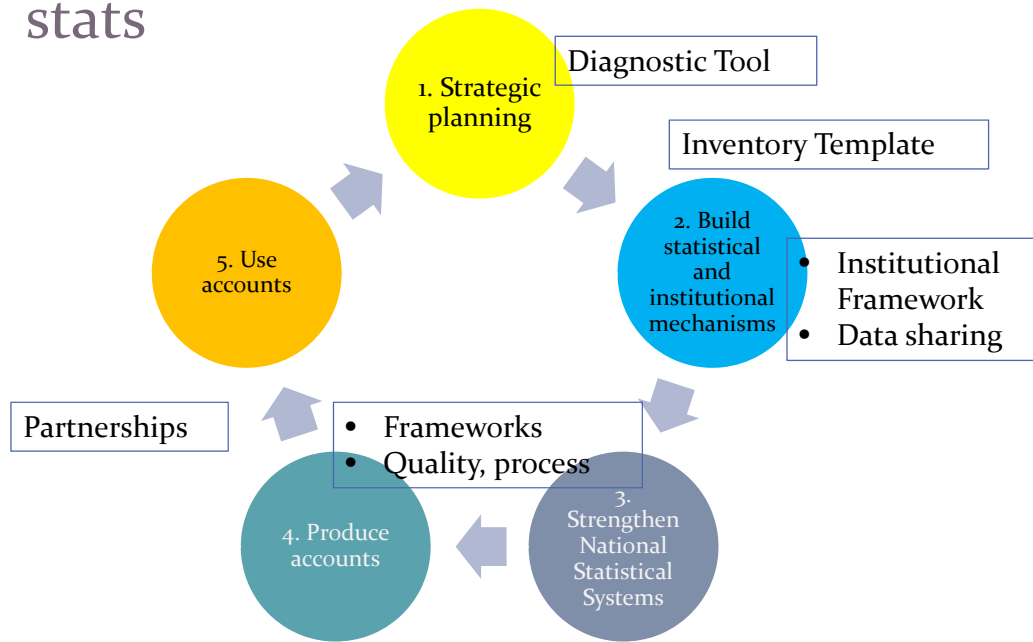
SEEA-EEA Accounts and tools



Tools

- Classifications (land cover, use, ecosystem services)
- Methods (Spatial units, scaling & aggregation)
- Biophysical modelling (future flows & filling gaps)

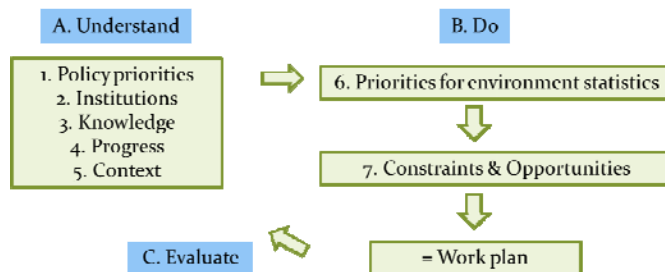
Stages of implementing environment stats



Implementing the measurement framework

1. Strategic planning (Diagnostic Tool): Iterative understanding of priorities and capacities

- National vision
- Engage NSS





Implementing the measurement framework

2. Build statistical and institutional mechanisms

- Leadership
- Funding
- Monitoring
- Implementation plan
 - Data sharing
 - New surveys
 - New compilation

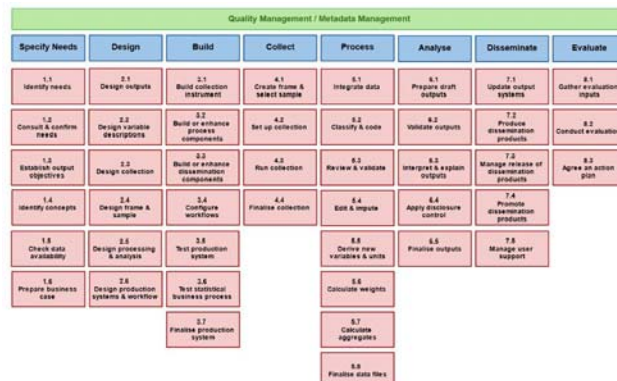


Implementing the measurement framework

3. Strengthen National Statistical Systems

- International guidance on statistical production
- Share data
- Centralize processes
- Quality guidelines

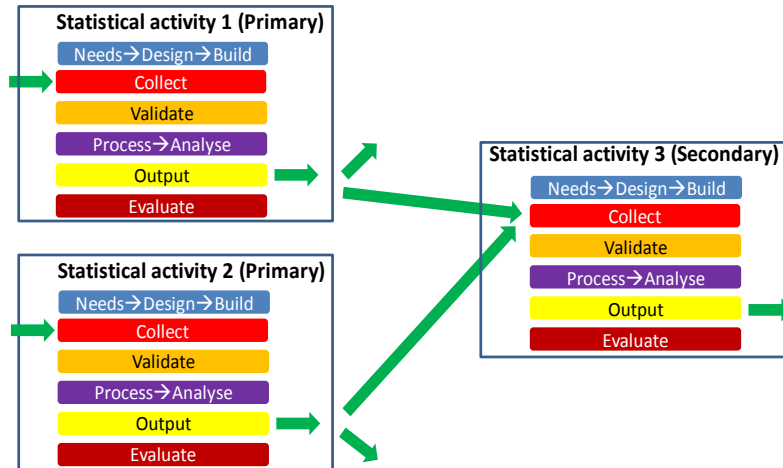
Generic Statistical Business Process Model (GSBPM)



Documenting existing activities

Inventory template for environment statistics

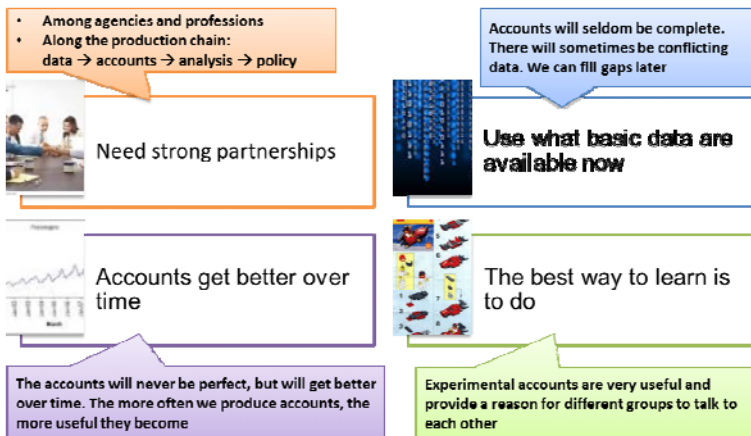
- To document external statistical “supply chain”



Implementing the measurement framework

4. Produce & 5. Use accounts

- Partnerships
- Get started
- Learn by doing
- Incremental improvement

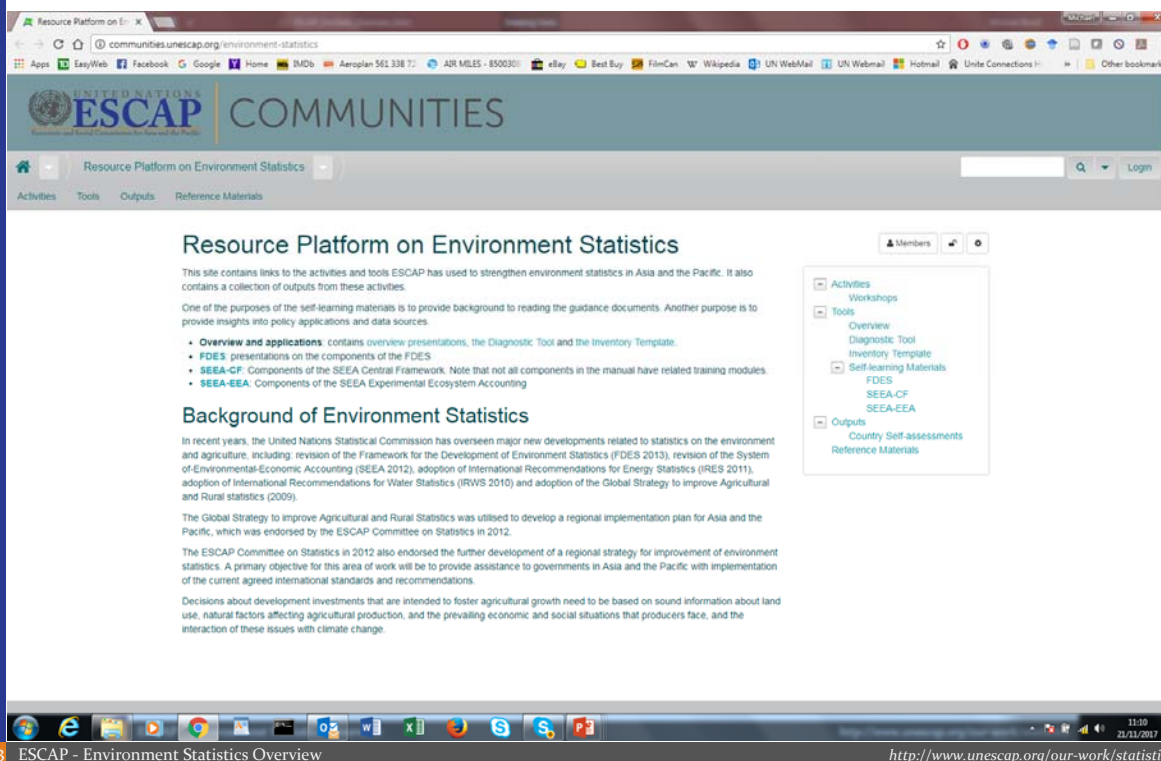


Take home messages

“Good statistics are cheaper than bad decisions.”

- FDES guides the collection of basic environment statistics
- The SEEA is a measurement framework to “disentangle” environment data (→ **Coherent**)
- Many countries are implementing SEEA as a way of harmonizing, prioritizing, estimating data (→ **Feasible**)
- It is linked to the SNA and many SDGs (→ **Relevant**)
- ESCAP provides technical assistance, training and work planning support

- Questions?
- Comments?



The screenshot shows a web browser displaying the 'Resource Platform on Environment Statistics' page. The page header includes the ESCAP logo and 'COMMUNITIES' text. Below the header, there are navigation tabs for 'Activities', 'Tools', 'Outputs', and 'Reference Materials'. The main content area features a title 'Resource Platform on Environment Statistics' followed by a brief description and a list of bullet points: 'Overview and applications', 'FDES presentations', 'SEEA-CF', and 'SEEA-EEA'. A 'Background of Environment Statistics' section follows, detailing the work of the United Nations Statistical Commission. On the right side, there is a sidebar menu with expandable sections for 'Activities', 'Tools', and 'Outputs'. The browser's address bar shows the URL 'communities.unescap.org/environment-statistics'. The page number '53' is visible in the bottom left corner, and the URL 'http://www.unescap.org/our-work/statistics' is in the bottom right corner.

References

- ESCAP: <http://www.unescap.org/>
- Gleeson-White, Jane. 2015. *Six Capitals: The revolution capitalism has to have – or can accountants save the planet?* <https://janegleesonwhite.com/six-capitals/>
- Holling, C.S., *Two Cultures of Ecology*. <http://www.ecologyandsociety.org/vol2/iss2/art4/>
- IMF-DQAF: <http://dsbb.imf.org/Pages/DQRS/DQAF.aspx>
- Paris 21. NSDS: <http://www.paris21.org/>
- Saner, M. and Bordt M. 2016. Building the consensus: The moral space of Earth measurement systems. *Ecological Economics* 130 (2016): 74-81.
- Statistics Canada, 2013. Human Activity and the Environment 2013: Measuring Ecosystem Goods and Services: <http://www.statcan.gc.ca/pub/16-201-x/2013000/aftertoc-aprestdm1-eng.htm>
- UNSD. 2013. Fundamental principles of official statistics. <http://unstats.un.org/unsd/dnss/gp/fundprinciples.aspx>
- UNSD. 2013. FDES: <http://unstats.un.org/unsd/environment/fdes.htm>
- UNSD. 2014. SEEA: <http://unstats.un.org/unsd/envaccounting/seea.asp>
 - Training materials: <http://unstats.un.org/unsd/envaccounting/workshops.asp?fType=2>
- World Bank. WAVES: <https://www.wavespartnership.org/>

Acknowledgements

- Thank you!
- Materials prepared by:
 - Michael Bordt
 - Regional Adviser on Environment Statistics
ESCAP Statistics Division
bordt@un.org